

Section 9-6

Lesson objectives:

- To learn the properties of dilations (orientation, size and shape).
- To learn the function of dilation.

Feb 23-10:08 PM

Section 9-6

Essential questions:

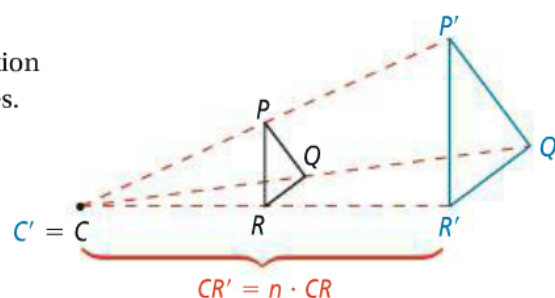
- What are dilations? How do they differ from other transformations?
- How do dilations affect objects in the coordinate plane?

Feb 23-10:08 PM

Dilations (resizing)

A **dilation** with **center of dilation** C and **scale factor** n , $n > 0$, can be written as $D_{(n, C)}$. A dilation is a transformation with the following properties.

- The image of C is itself (that is, $C' = C$).
- For any other point R , R' is on \overrightarrow{CR} and $CR' = n \cdot CR$, or $n = \frac{CR'}{CR}$.
- Dilations preserve angle measure.



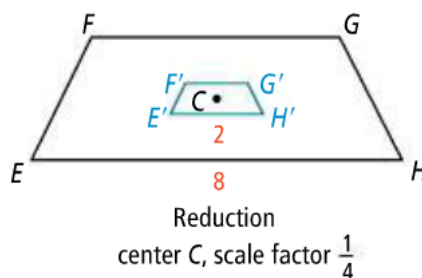
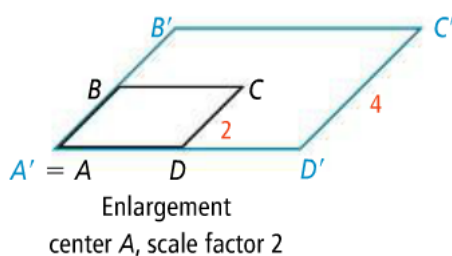
Dilations do NOT preserve size/shape.
Therefore they are NOT rigid motions!

Feb 23-10:07 PM

Example: scale factors

The scale factor n of a dilation is the ratio of a length of the image to the corresponding length in the preimage, with the image length always in the numerator.

A dilation is an **enlargement** if the scale factor n is greater than 1. The dilation is a **reduction** if the scale factor n is between 0 and 1.

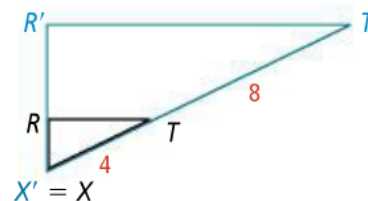


Feb 23-10:14 PM

Example: scale factors

Multiple Choice Is $D_{(n,X)}(\triangle XTR) = \triangle X'T'R'$ an enlargement or a reduction? What is the scale factor n of the dilation?

- ☐ A enlargement; $n = 2$
☐ C reduction; $n = \frac{1}{3}$
☐ B enlargement; $n = 3$
☐ D reduction; $n = 3$



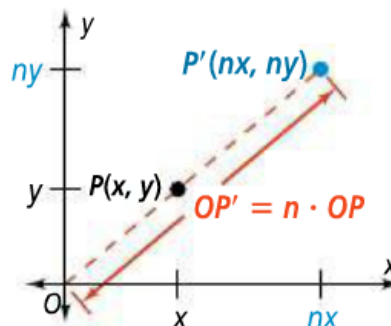
Remember: our ratio is: $\frac{\text{new}}{\text{old}}$

Feb 23-10:14 PM

Dilation: point by point

To scale a point just multiply the coordinates (x,y) by the scaling factor, n .

$$D_n(x, y) = (nx, ny)$$



Feb 23-10:25 PM

Example

Problem 2 Finding a Dilation Image

What are the coordinates of the vertices of $D_2(\triangle PZG)$? Graph the image of $\triangle PZG$.

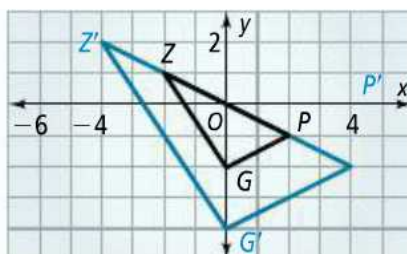
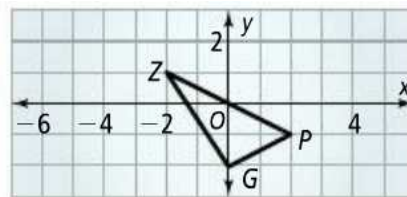
Identify the coordinates of each vertex. The center of dilation is the origin and the scale factor is 2, so use the dilation rule $D_2(x, y) = (2x, 2y)$.

$$D_2(P) = (2 \cdot 2, 2 \cdot (-1)), \text{ or } P'(4, -2).$$

$$D_2(Z) = (2 \cdot (-2), 2 \cdot 1), \text{ or } Z'(-4, 2).$$

$$D_2(G) = (2 \cdot 0, 2 \cdot (-2)), \text{ or } G'(0, -4).$$

To graph the image of $\triangle PZG$, graph P' , Z' , and G' . Then draw $\triangle P'Z'G'$.



Feb 23-10:28 PM

Pop quiz?

Exit ticket?

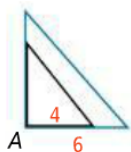
Dance party?

Feb 23-10:30 PM

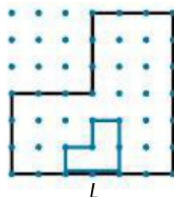
Exit Ticket

The blue figure is a dilation image of the black figure. The labeled point is the center of dilation. Tell whether the dilation is an enlargement or a reduction. Then find the scale factor of the dilation.

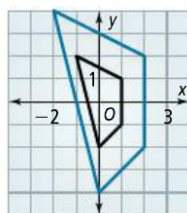
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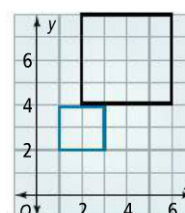
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3



4



Rate yourself on how well you understand this: 1= not at all;
2 = somewhat, but need help; 3 = pretty well, just a little
help needed and 4 = I know this well and can help others.

Feb 23-10:32 PM